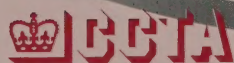


# Information Superhighways

*Opportunities for public  
sector applications in the UK*

A Government  
Consultative Report

*May 1994*



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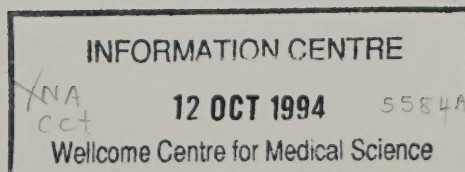
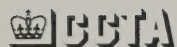
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*Opportunities for public sector  
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A Government Consultative Report

May 1994



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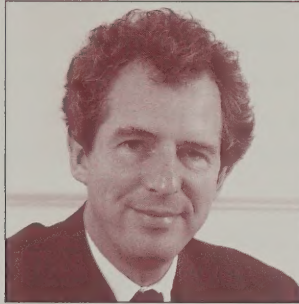
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## Foreword



*Chancellor of the Duchy of Lancaster  
Rt Hon William Waldegrave MP*

A number of countries are exploring the possibilities presented by new and high capacity computer and telecommunications infrastructures with widespread coverage. While such infrastructures are increasingly available at trunk level and to large businesses, much remains to be done in most countries in extending their reach into individual homes and businesses, and in exploring the most effective ways in which they may be used. This report considers the opportunities and benefits for UK government departments from Information Superhighways. It provides a valuable source of information for future discussion on this important topic.





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## Summary

### Background

This study has been undertaken by CCTA to investigate the opportunities presented by digital *Information Superhighways* for public sector applications in the United Kingdom. It suggests a framework for identifying and forming joint ventures with industry and government in the development of digital-based public services for the citizen.

The foundations for the UK framework are in place; organisations in the public and private sectors have for some time been investing in digital technologies and the general thrust of legislation in telecommunications since 1984 has been to promote competition in all sections of the telecommunications market. The emerging Information Superhighways would make it possible for services to be accessible from inexpensive commodity devices located in the home, high street and places of work, and thus provide citizens with easier access to government.

OPSS has responsibility for raising the standard of public service and the effectiveness and efficiency of central government in the UK and will have a keen interest in the potential business uses that Information Superhighways present to government departments. DTI has the policy lead for telecommunications regulation in the UK, with regulation of the telecommunications market as the statutory responsibility of the Director General of Telecommunications. Liberalisation has stimulated the market through competition, to the extent that the availability of modern communications in the UK compares favourably with the rest of the world.

### Other Information Superhighways initiatives

In the USA, the Information Superhighway is a key element of the Clinton administration's use of technology as the motor for economic growth. Its thrust is to remove inhibiting legislation and to allow the market freedom to develop innovative technologies and services (in Europe and the far East a number of comparable initiatives are being explored). The programme is based on the following five principles:

- encourage private investment
- provide and protect competition
- provide open access to the network
- avoid creating information 'haves/have nots'
- encourage flexible and responsive government.

**The role of UK government**

The UK is already well positioned to benefit from the new opportunities presented by Information Superhighways, given the advanced nature of its telecommunications infrastructure and the high level of investment being undertaken by multiple operators to improve provision. The other important role for government is to review the capabilities of departments to improve services by exploiting these infrastructures and to increase the openness of government.

**Departmental roles**

CCTA recommends that those departments with key interests should be brought together to consider the way forward.

Each department needs the freedom to examine the potential of digital technologies for achieving its own business objectives, but a coordinating role may be needed to ensure that participants benefit from economies of scale, to avoid duplication of effort and to safeguard the interests of effective government.

UK government would establish the relevant contact between the private and public sectors to take this forward.

**This report**

There are substantial business opportunities for the private and public sectors that would make increased investment attractive; this report focuses on the opportunities for government.

# 1 Information Superhighways - a model for UK government

This section explains how Information Superhighways would work. Figure 1 shows a simple three layered model; its component parts are used to describe the architecture of an information superhighway. Public sector examples are used to illustrate potential consumer services, although a multitude of other opportunities will exist for the private sector.

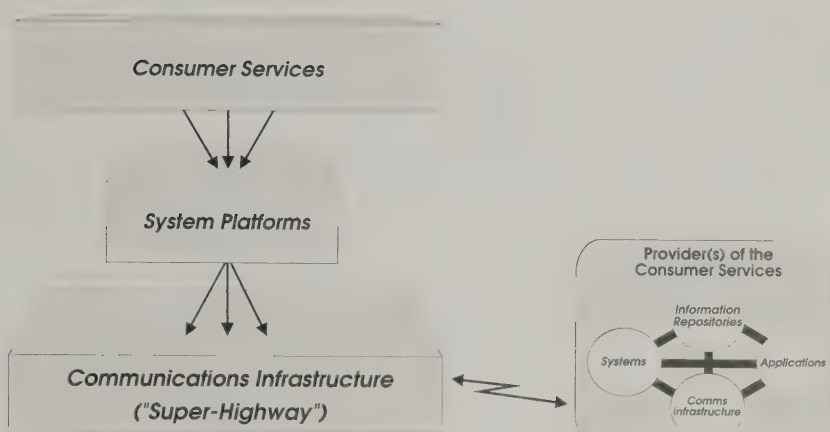


Figure 1: Information Superhighway architectural model

## 1.1 Consumer services

The Consumer Service component, depicted in Figure 2 below, describes typical end-user consumer service applications which might be accessible from the home, the high street, public or private sector establishments.

Key attributes which would make these services successful include low cost, high availability and good *usability* (that is, good look and feel, speed of response, help tutorials etc). Access to multiple consumer services from a minimum number of system platforms is important, rather than having to switch between devices in order to use different services.

Each government department will wish to assess what consumer services it may wish to offer. Examples include:

- electronic correspondence between government departments and citizens (for example, tax, social security, vehicle registration)



Figure 2: Examples of Information Superhighway consumer services

- the ability for citizens to review information remotely (school/college prospectus, jobs vacancies etc)
- receipt/dispatch of electronic mail (including voice and video messages) whilst at home, at work or when mobile utilising wireless communications
- remote booking of appointments by the public (for example, hospital appointments).

Information Superhighways may well accelerate the development and availability of consumer services in addition to those described above. Promotion of the concept would help to overcome the initial barriers perceived in the take-up of the services – such as lack of awareness and understanding of benefits, potential risks of new technology and acceptance by citizens.

The user interfaces for the consumer services will need to be designed to take into account the diverse backgrounds of potential consumers. It will be up to the providers of these services, through the medium of the communications infrastructure and system platforms, to design appropriate easy-to-use access to information (thus the availability of tools to assist this task will be an important factor in applications development for consumer services).



## 1.2 System platforms

The System Platform component describes those systems and devices which the consumer might use to access services. These systems and devices will only be useful if they are readily available, reasonably priced and fit for the purpose.

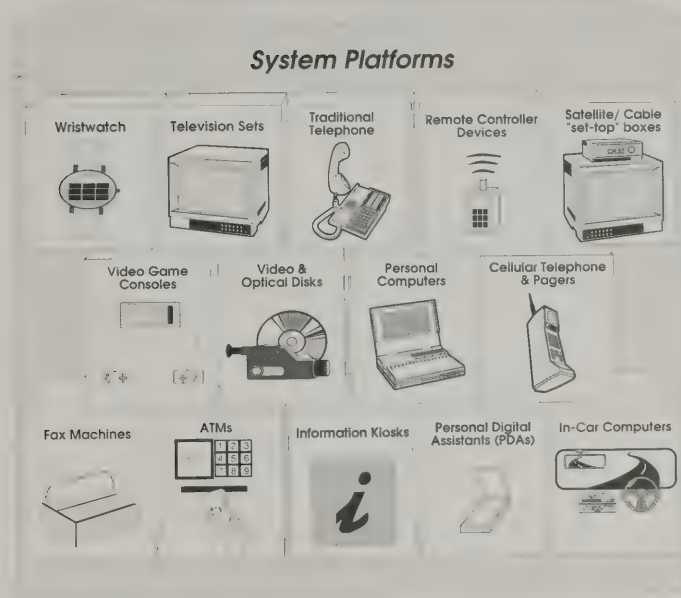


Figure 3: Examples of Information Superhighway system platforms

Current system platform devices include televisions with teletext services, telephones with tone dialling capabilities, cable and satellite "set-top" boxes (that is, multimedia "decoders"), home video-games consoles, as well as personal computers/workstations, and in-car computer systems. Thus the System Platform component represents the Information Superhighways systems and devices located in the home, the high street, public or private sector establishments.

## 1.3 Communications Infrastructure

The Communications Infrastructure component is the transmission medium between the consumer and the provider of a consumer service. Figure 4 below shows some of the possible communications infrastructure media technologies that might be used. Thus the Communications Infrastructure represents the Information Superhighway physical linkages *between the* service provider and the home, the high street, public or private sector establishments.



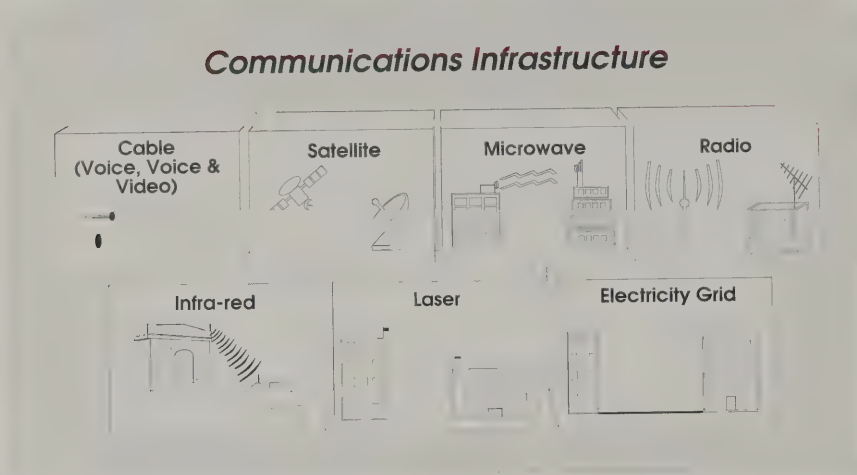


Figure 4: Examples of Information Superhighway communications infrastructure media

In Figure 4, the box marked "Cable" could itself be expanded, ranging from conventional home telephone wiring to coaxial cable and fibre optic cabling, providing higher quality and greater data throughput.

In this document the communications infrastructure is viewed as a set of managed services, where the availability of spare capacity might be made available to deliver the new Information Superhighway consumer services. The realisation of this spare capacity is likely to be identified through the need for communications infrastructure providers to compete with each other.

## 2 The future

This section describes a possible future with more established Information Superhighways. The section draws on examples of current technology and perceived future trends. It provides an overview of the evolving technology and highlights a number of potential public sector consumer services which could become available with Information Superhighways.

### 2.1 Introduction

Whilst the term “Information Superhighways” is new the concept has been applied for many years. For example:

- banks have been using networks for electronic funds transfer
- several commercial sectors rely on electronic data interchange
- UK government departments have had access to the Government Data Network (GDN) managed by CCTA
- booking agents have had online access to worldwide airline seat reservation services
- thousands of organisations have had access to the infrastructure and services provided on the Internet network
- the Joint Academic Network is widely used across academia.

What is new, however, is the development of industry standards for data compression and the advent of multimedia applications (integrated digital audio, image and full motion video) which can be stored on relatively low cost (business) IT hardware. This, coupled with recent agreements and deployment of industry standards for high speed communications networks, has opened up possibilities for new ease-of-use applications which require no training for the average citizen to use. Infrastructures which provide such applications will offer the potential for the average citizen to have access to a wealth of new public sector applications and information services.

### 2.2 Technology evolution

Technology is now becoming available that has the potential to provide electronic interactive public services to the citizen at their home, using familiar looking “living room” devices such as a television, remote control device and telephone. However, most current system platforms found in the home typically provide limited interactive capabilities (for example, limited to changing TV channels and paging through screens of Teletext) although there are more advanced systems providing more extensive activities.

The next generation devices will offer interactive capabilities such as control of what you want to see and when. Examples of home consumer services currently being tested in the UK and elsewhere, and which are using these interactive devices, include facilities to:

- select items to purchase in a home shopping application
- move bank account funds electronically (for example, to pay your bills)
- remotely access and watch estate agents' digitally stored videos of property for sale which meet your chosen criteria (cost, size, location etc)
- electronically retrieve movies/TV programmes to watch in your home at a desired time
- play complex computer games with teams of players.

Home computing has been increasing over the last few years but is still not believed to be a "living room" activity. Thus it is unlikely that the traditional personal computer (PC) will be the system platform device for the short to medium term that will be used in most UK living rooms to access Information Superhighways consumer services. This is primarily because:

- only 15% of UK homes currently have PCs
- the entry price of about £1000 for a multimedia PC is too high for the average home consumer
- "living room" devices have approximately a five-year replacement life whereas PC hardware/software is constantly changing through upgrades involving additional costs
- most PC applications are not simple enough to be used by the average home user without training.

Providers of different communications infrastructures will increasingly compete with each other for business from those organisations with potentially high revenue earning consumer services (to provide, for example, non-interactive satellite broadcasts **versus** interactive cable services **versus** partially interactive "video on demand" services through the existing telephone infrastructure). This is analogous to the entertainment sector where different deliverers (terrestrial broadcasters, cable, satellite and video rental companies) compete for Hollywood studio business in order to bring the best selling films to the consumer.

**2.3 Competing technologies** Broadly, there are three base (competing) technologies which offer significantly different capabilities, and consequently costs. Each has its champions.

The *first* is the high-capacity super-computer network. An example (already in place) in the UK is the “SuperJANET” network for academia. In the USA the “Gigabit Testbed” is testing similar ideas. This is essentially a research field, but one which has potential in the ten year timeframe. Current test applications are high-quality medical imaging and the direction of immense computer power at previously intractable problems.

The *second* is the “Internet”, a collaborative network run by academic and research communities in the US, and now worldwide. It provides relatively low cost access to a wide range of computing facilities. However, the service is not guaranteed, there is no billing system for use, the user interface is unfriendly and investment in the infrastructure is quixotic. There are a number of other potentially serious problems with the “Internet” stemming from the degree to which access is open (“hacking”, unauthorised publication of material etc).

The *third* is the commercial application of new, but extant, technologies to provide a range of facilities primarily addressing a mass market, but capable of tailoring for business use. These are a combination of small, powerful computers, which can be located at telephone exchanges or cable television distribution centres; signal compression equipment which allows complex images to be sent along simple cabling; and decompression and control equipment that is small, and inexpensive, enough for the domestic market.

Applications of the third technology seem most likely to first achieve commercial success, and may generate very substantial revenues. If it succeeds, then networks of the Internet type will need to be largely adapted if they are to become widely used; this may well occur by the adoption of very advanced technology, of the “Gigabit Testbed” type.

## 2.4 Applications

Services of the third type are being piloted in the UK and USA. For example, one such pilot provides interactive services through domestic television sets in a highly personal, and individual, way. A simple one-button device controls the picture, and the television addresses the customer by name, speaking through a life-like computerised image. The facilities available include:

- home shopping, using the television to ‘walk’ around stores, controlled by the pointer device

- fast food ordering and delivery
- entertainment; videos and games
- electronic banking
- video messaging.

For the vast majority of consumers this is likely to be the first practical manifestation of Information Superhighways. The scope is very wide. Low cost pervasive technology can be directed at providing a very wide range of services in a novel way. Initially applications are likely to be focused on the most simple, high demand areas.

Commercially, opportunities exist at different levels:

- installation and operation of the infrastructure
- tailoring, marketing and presentation of the applications and services
- development of entirely new means of retailing, selling through 'shops' which exist only as video images and delivering through efficient supply chains.

*An issue of interest to the government is whether a market will develop for sophisticated products such as financial or information services in the private sector, which will then attract investment in infrastructure which the public sector can exploit, or indeed whether the public sector opportunities are great enough to drive these developments.*



### 3 The way forward

The role of government is to harness those opportunities for public sector applications so that public services are improved. The concept of Information Superhighways, on the evidence available so far, is attractive to both the public and private sectors. There are opportunities for business benefits, and risks for those who fail to take advantage of these opportunities. Similarly, there are possibilities to enhance the quality of everyday life - and certainly the quality of services offered by government departments - by the deployment of these technologies.

The potential impact is wide, extending across the remit of a number of departments, and may in due course come to affect the activities of most. This suggests a degree of coordination will be required, with the major players being:

- DTI, with its responsibility for telecommunications sponsorship and regulation and a number of other communications issues
- OPSS, with its responsibility for improving the quality of government service and promoting more open government
- Department of National Heritage, with its responsibilities for broadcasting.

Short-term activities would seem to be:

- reviewing with departments the opportunities to improve services and their capabilities to exploit technologies
- reviewing the opportunities to increase the openness of government.

Government will coordinate a review of the opportunities available to the relevant departments, involving key private sector interests in this work.



## Annexes



# A Success attributes

The Information Superhighway is more likely to be regarded as successful by *consumers* if the following attributes have been addressed by the providers of the consumer services, system platforms and communications infrastructures.

## *Success Attributes: Consumer Services*

<i>Attribute</i>	<i>Description</i>
Attractive	In order for the consumer services to attract the use of most citizens, the applications should have good visual design. Use of multimedia combining colour pictures, digital sound and full motion images is likely to be necessary. Skills needed to produce such applications will be combinations of those found in graphic designers/artists, ergonomists and production teams for full motion images, as well as the skills possessed by existing IS/IT software developers.
Usable	An intuitive and common user interface will assist usability across different consumer services.
Low cost	Consumer service providers in conjunction with the communications infrastructure providers will need to fix pricing to compete with alternative delivery mechanisms such as for “movies on demand”, the total cost (film usage and line charge) will have to be close to the cost of video rental; charges for access to information, as opposed to entertainment services, may be harder to determine and justify to the citizen.
Readily available	Access to the consumer services is anticipated in a number of different environments: at home, at work, in the high street etc. The consumer will want near instant response when accessing a service and will not want to have to make numerous on-screen menu selections in order to identify the service required.
Entertaining/Useful	The consumer service will of course need to have a valid use or be entertaining (or both) otherwise it will not become popular. In this way it could be worthwhile to combine information services from different sources/sectors to attract the average citizen to the usefulness of the system. For example, a high-street ATM/cashpoint machine might be enhanced to offer other services such as advice about income tax or benefits, or local tourist information. In this way the perceived usefulness of the machine would increase as it is seen not just as a banking facility, but more as a “one-stop” citizen’s entry point to a variety of information services. The costs of these high street system platforms might then be shared between providers of the consumer services and this could lead to an increase in the deployment of such systems. Figures from the Henley Centre for Forecasting show that in the UK, 36% of the population have never used a cashpoint machine compared to 65% who have never used a personal computer.



*Success Attributes: System Platforms*

<i>Attribute</i>	<i>Description</i>
Multi-function	Consumers will not want (or pay for) many different devices to access many different services.
Interactive, multimedia, easy to use	System platforms are likely to have to support interactive, multimedia applications in order for the consumer services to be easy-to-use by the average citizen.
Personal preference filters	Consumers will want to minimise information overload. Thus systems that provide mechanisms to allow the creation of personal preference filters (that is, so that they receive only what they want to see) will be attractive.
Auto-retrievers	Consumers are likely to want to automate search and retrieval facilities to assist the process of searching vast information repositories across multiple information servers.
Comms protocol support	System platforms will need to support relevant communications protocols to enable interoperability over the communications infrastructure with corresponding systems used by providers of the consumer services.
Low cost	Consumers, particularly in the home market, are unlikely to be prepared to pay much for the system platform devices (for example, existing cable and satellite platforms tend to cost the average household between £25-£250 as a one-off cost).

*Success Attributes: Communications Infrastructure*

<i>Attribute</i>	<i>Description</i>
Low cost	Consumers, particularly in the home market, are unlikely to be prepared to pay much for the use of the communication infrastructure.
Support multimedia	The infrastructure media used will need to be able to support the types of consumer service applications envisaged (for example, interactive, full motion video and digital sound) whether it is high speed networking media or lower speed media with good compression techniques.
Long life	Consumers, particular in the home market, will not want to have frequent changes in infrastructure connections and it is envisaged that the infrastructure replacement life will be between 5-15 years (that is, the same as present day cable replacement life).
Secure	The infrastructure should provide appropriate levels of security to ensure that personal and other potentially sensitive items of information are not accessible by unauthorised users.

## B Potential public sector applications

This section provides a list of possible Information Superhighways consumer services which could be offered from a variety of public sector organisations. It should be noted that these services *are only examples and are not necessarily under consideration by the organisations concerned*.

<i>Department / Agency</i>	<i>Consumer service</i>	<i>Description</i>
<b>Agriculture</b>	Information access	Public access to information (such as symptoms of animal diseases in the UK) in the form of text, image, video etc, for research and collaboration with associated organisations
<b>British Library</b>	Information access	Public access to library records and publications
<b>Cabinet Office</b>	Electronic messaging	Electronic access by the public to heads of government (Prime Minister and Cabinet etc)
<b>Charity Commission</b>	Remote forms handling	Electronic voting on public referendums and general elections
	Remote forms handling	Remote access to electronic forms for companies to apply to become a charity
	Information access	Public access to the Register of Charities
<b>Customs &amp; Excise</b>	Transmission of images	Access to pictures/video of suspect vehicles and goods at UK points of entry/exit
	Remote forms handling	Remote access by the public to electronic forms for claiming rebates on VAT, for example
<b>Education</b>	Video conferencing	Remote tuition/lectures from guest specialists
	Information access	Online access to school/college prospectus, syllabus and vacancy information
<b>Employment</b>	Information access	Remote access by the public to job vacancy information
	Remote forms handling	Employer notification of vacancies to Job Centres
<b>Environment</b>	Remote forms handling	Notification, by the public, of perceived environmental misconduct

<i>Department / Agency</i>	<i>Consumer service</i>	<i>Description</i>
<b>Foreign &amp; Commonwealth</b>	Video conferencing	Remote meetings of FCO officials and interpreters abroad  Remote interpreting - a variation on video conferencing, where sight of those interpreting does not need to be transmitted and thus enabling interpreters to be centrally based and not necessarily sent to translate at meetings overseas
<b>Health</b>	Video conferencing	Remote consultation by GPs, surgeons and consultants
	Transmission of images	Patient tracking facilities including images electronic movement and access to X-Ray/Cat-scan images and other medical records across regions
	"Appointments"	Remote booking of appointments by the public to see doctor/consultants in their surgery/hospital
	Information access	Online global information repository about available donor organs
<b>HM Land Registry</b>	Information access	Public access to survey report information
<b>Home Office</b>	Transmission of images	Police information accessible to other departments (for example, Customs & Excise), transmission of images of missing/found persons and goods, fingerprint images and access to automatic image matching facilities
	Remote forms handling	Remote access for the public to electronic application forms for passports, potentially involving support for transmission of photographic images
	Information access	Online repository of information about stolen goods such as cars
<b>Inland Revenue</b>	Remote forms handling	Remote access for the public to electronic forms for completing tax assessments and requesting rebates
<b>Intervention Board</b>	Information access	Remotely accessible information about quotas and quantities of stored produce

<i>Department / Agency</i>	<i>Consumer service</i>	<i>Description</i>
<b>Lord Chancellor's Department</b>	Information access	Remote access by Magistrates' Courts to information belonging to associated organisations (for example, DVLA)
<b>MOD</b>	Electronic publishing	Electronic movement of technical and drawing specifications for MOD equipment
<b>Museums</b>	Information access	Remote access by the public to historical records (including image/video data).
<b>National Heritage</b>	Information access	Remote access by the public and potential tourists to information (including image/video) of national galleries, treasures, landmarks and places to visit
<b>National Savings</b>	Electronic trading	Public access to personal savings accounts and movement of funds to other destinations (for example, to other accounts or across government departments)
<b>OPCS</b>	Information access	Online access to lists of winning Premium Bonds numbers
	Information access	Online remote access (chargeable?) to statistical summaries for use by market forecasters
<b>OPSS</b>	Remote forms handling	Electronic market research questionnaires from the Citizen's Charter Unit to the public
<b>Ordnance Survey</b>	Transmission of images	Electronic access (chargeable?) to mapping and charting information and the National Land Information System
	Mobile navigation	Mobile access to electronic maps and directional information
<b>ODA</b>	Electronic messaging	Messaging between the department, remote employees abroad and their family and friends
<b>Palace of Westminster</b>	Video conferencing	Public access to Select Committee meetings
	Information access	Electronic access to Hansard text and recorded video coverage
	Electronic messaging	Public access via electronic mail to MPs

<i>Department / Agency</i>	<i>Consumer service</i>	<i>Description</i>
<b>Property Holdings</b>	Information access	Electronic information (including image/video) on vacant properties
<b>Property Services Agency</b>	Information access	Online information about the status of various public sector construction projects
<b>Royal Household</b>	Information access	Electronic access to information about the daily schedules of the Royals, video coverage of visits and speeches
<b>Scottish Office</b>	Information access	Online publicly accessible information about job vacancies, business park sites, grants available (such as for new businesses)
<b>Social Security</b>	Information access	Online information and advice about social security, pensions and benefits
	Remote forms handling	Online public access to electronic forms for claiming social security, pension entitlement and benefits
<b>Trade &amp; Industry</b>	Information access	On line public and business access to a very wide range of services for businesses and consumers
	Remote forms handling	Remote public access to services including electronic forms
<b>Transport</b>	Remote forms handling	Remote public access to electronic DVLA vehicle licence application forms
	Mobile navigation	Online public access when mobile to directional information, up-to-date traffic reports, and train timetables with status reports on the progress of individual trains
<b>HM Treasury</b>	Information access	Online public access to Budget statements, financial reports and economic model forecasts
<b>Welsh Office</b>	Information access	Online public access to information about job vacancies, business park sites and grants available (such as for new businesses)



## C The issues

This section highlights issues associated with the establishment of Information Superhighways that will need to be discussed with relevant organisations (other public sector departments, infrastructure providers etc) as part of the project to develop Information Superhighways.

<i>Issue</i>	<i>Comment</i>
Technophobia issues	Care must be taken to ensure that services provided will be easy enough for the average citizen to use, potentially supporting a direct connection (visual and/or audio) to a “human” assistant when required. Lessons could also be learnt from the introduction of cashpoint machines into the UK some years ago.
Security: access, authentication and non-repudiation	Security controls will be needed to ensure that only citizens with appropriate authority can access information (and amend data) on themselves or other citizens – for example, to view bank account details, transfer funds, draw social security.
Management of infrastructure and services	Technology providers will need to manage not only their system devices and infrastructures but also the data and information they use - which itself may not be owned by the technology providers.
Legal: Data Protection Act	It is likely that as more citizens use these services, more electronic information about them will be held. This information will need to be registered and managed appropriately to comply with the legislation.
Legal: Civil Liberties	Information providers will need to balance the requirement for freedom of information versus intrusion into personal privacy/information.
Legal: Admissibility/evidential	The legal status of electronic contractual documents and signatures for authorising transactions will need to be agreed.
Legal: Rights	As more electronic data becomes used and circulated (particularly with electronic publishing in educational and entertainment based services), issues relating to Intellectual Property Rights, copyright, licensing and patent rights issues for the creators (talent), publishers and deliverers of services will arise. This will be of particular importance where technology is being used that is so new (for example, video on demand) that it is not covered by existing “rights contracts”.

Legal: National  
differences

Access will be possible to information sources and services outside the UK. This brings into question the issue of national differences with respect to licensing rights, freedom of information, access to offensive material etc.

Impact on existing  
deliverers of services

As new enterprises emerge, existing ones may disappear. There is a belief by some in the industry that there is no "new money" to be made by introducing electronic services to the consumer and that money will be made by displacing existing service and delivery providers (for example, video rental stores, broadcast television, postal service etc). This view was echoed in a recent CNN interview in March 1994 by the US Postmaster General, who stated that the Postal Service currently has 60% of the US postal mail market but expects to see this decrease to 30% by the year 2000 with the advent of electronic communications.

Social

If more information becomes accessible from the home, there will be social implications relating to the potential creation of a home-based society. Whilst some individuals may like to queue outside post offices, or for a passport/visa application, or spend time walking around a supermarket, there will be others who prefer to do this electronically from their home, thus saving them time to spend on social activities that are more important to them.

Cultural

There may be potential cultural implications if UK consumers choose to shop and view services mostly from non UK-based providers.

Political

There is likely to be a requirement to establish links between governments in countries which are establishing similar Information Superhighways in order to agree on common "boundary" and cross-border issues and laws (for example, to stimulate common freedoms for citizens in a globally networked community).

Economic territory  
boundaries

It will be possible to shop for items (including large items such as cars) electronically in UK shopping stores as well as abroad. Thus inter-government discussion will be necessary to ascertain whether current mechanisms are sufficient for checking such things as payment of import tax/duty and the identification of goods across borders.

Standards: consumer  
services

In the same way that consumers will not want to have to use different systems platforms to access different services, consumer service providers will not want to have to develop and maintain many different versions of the same application for each system platform (such as for a PC, a TV set-top box from supplier A, a TV

set-top box from supplier B). Open standards will be needed for consumer service providers to use in order to develop applications just once for many types of different platforms and in order to support common user interfaces across different consumer services. Information Repository standards and Information Format standards will also need to be utilised by these applications so that information content is reusable across different platforms.

#### Standards: system platforms

System platform and consumer service providers may request guidance/focus from large user organisations, about which "standards" (for example, OSI or TCP/IP, over ISDN or ATM) to adopt for support of digital communication over the infrastructure. If the Information Superhighways project focuses on developing and promoting consumer services, then one of the attributes for a good consumer service will be its accessibility. Using this attribute will allow a decision to be made based on economic considerations, market forces and availability.

#### Standards: communications infrastructure

Similarly, system platform and consumer service providers may request guidance/focus from large user organisations about which types of infrastructures to support (for example, fibre optic, coaxial, unshielded twisted pair telephone). And again, by concentrating on developing and promoting consumer services rather than the underlying technologies, the Information Superhighways project will not restrict competition of these technologies, but promote a decision to be made based on market forces, availability and suitability for supporting the types of applications envisaged.

#### Cost: charging policies

Providers will need to decide charging policies for the platforms, infrastructure usage and services, where competing delivery mechanisms (for example, video rental versus "video on demand") are likely to be highly competitive. There are a number of charging schemes currently under discussion by providers including:

- similar to cable TV charges – that is, a returnable deposit for the system platform, an initial connection charge, a monthly charge for core services and an additional charge for premium services
- charging which is based on a percentage of the value/information content of service used
- charging which is based on local telephone call rates rather than long distance occupancy to the information source

- charging which decreases depending on the amount of commercial advertisement received.

A distinction in telephony charges currently exists between UK and USA which should be highlighted. In the USA there are numerous telephony providers who provide free local calls. This has stimulated the growth in home consumer use of bulletin boards and other information services through a PC/modem using the existing home telephone line. A similar growth is unlikely to occur in the UK while households have to pay for local calls. The UK situation may change as competition between cellular and cabled telephony increases.

## D The benefits

This section highlights some of the associated benefits that might be achieved once integrated Information Superhighways are established.

### *Consumer service*

#### *Benefits*

#### Electronic trading

Reduced human intervention, thereby speeding up the processing time of financial transactions

Increases in the number of transactions between organisations (and citizens)

Reduced staff handling costs of processing

Reduced cost of postage

Reduced lost opportunity costs

#### Electronic (multimedia) mail

Reduced human intervention, thereby speeding up delivery time of mail to the recipient

Increases in the usage of mail between organisations and citizens

Reduced staff handling costs of processing

Reduced cost of postage

Reduced lost opportunity costs

Ability to read and reply to messages when mobile

Ability to re-direct mail to alternative recipients

Ability (with sound and moving video images) to reduce the potential for misunderstanding of the message content

#### Video conferencing

Reduced cost of travel to meetings

Reduced lost opportunity costs

Increased time available for other activities

#### Information access

Access to dynamically updated information

Reduced need for human response to enquiries and staff handling costs

Increases in information available to organisations and citizens

Reduced cost of postage

Reduced lost opportunity costs



<i>Consumer service</i>	<i>Benefits</i>
Remote forms handling	<p>Ability to create better help facilities than equivalent paper-based forms to assist consumers</p> <p>Reduced errors in completed forms leading to reduced staff handling costs in processing forms and reduced processing time</p> <p>Reduced cost of postage</p> <p>Reduced lost opportunity costs</p>
Receipt/transmission of images	<p>Reduced human intervention, thereby speeding up movement of images between organisations; increases in the number of associated organisations receiving the images (for example, X-Rays sent to hospitals, a patient's doctor, a remotely located consultant)</p> <p>Reduced staff handling costs of developing and copying</p> <p>Reduced cost of postage</p> <p>Reduced lost opportunity costs</p> <p>Ability to access images when mobile</p> <p>Ability to re-direct images to alternative recipients</p>
Electronic publishing and dissemination	<p>Reduced human intervention, thereby speeding up dissemination times</p> <p>Increases in the usage of distribution to isolated centres for publication to the local community (for example, news magazines sent electronically via satellite to automated printing facilities located in remote communities)</p> <p>Reduced staff handling costs in processing and delivering</p> <p>Reduced cost of postage</p> <p>Reduced lost opportunity costs</p> <p>Potential basis for "electronic books" and news information which could be downloaded to an appropriate system platform when mobile</p> <p>Basis for growth in "locally oriented" community news and information services</p>





